AMERICAN JOURNAL OF PHARMACY

PUBLISHED BY AUTHORITY OF THE

Philadelphia College of Pharmacy

PUBLICATION COMMITTEE

SAMUEL P. SADTLER, PH.D., LL.D. — M. I. WILBERT, PH.M.
JOSEPH W. ENGLAND, PH.M. — CHARLES H. LAWALL, PH.M.
JOSEPH P. REMINGTON, PH.M., F.C.S. — GEORGE M. BERINGER, PH.M.
AND THE EDITOR

HENRY KRAEMER, PH.D., Editor

VOL. 88 — NOVEMBER, 1916 — NO. 11

CONTENTS.

A New Method for the Determination of Vanillin in Vanilla Extract. By Arthur W. Dox and G. P. Plaisance, Iowa Agricultural Experiment Station 481

A Method for the Determination of Salol and Acetanilid in a Mixture of the Two, and of Salol and Acetphenetidin in their Mixtures. By Benedict Salkover, B. Ch. E., Cincinnati, Ohio 484

The Vascular Anatomy of Piper Methysticum. By Rachel E. Hoffstadt, Ph. D. 485

Fifty Years of Manufacturing Pharmacy and Biology: The Story of Parke, Davis and Company 503

Current Literature: Saw Palmetto; The Poisonous Principle of Poison Oak; On the Constituents of Poison Ivy; The Castor-Oil Plant of India 517

Thirteenth Annual Convention of the National Association Boards of Pharmacy. By Prof. E. L. Newcomb, University of Minnesota 520

Philadelphia College of Pharmacy; Minutes of the Semi-Annual Meeting; Absracts from the Minutes of the Board of Trustees 523

News Item 528

Price, $3.00 per Annum, in advance — Issued in Monthly numbers of not less than 48 pages

SINGLE NUMBERS, 30 CENTS
BACK NUMBERS, 50 CENTS

Address all communications to
The American Journal of Pharmacy, 145 North Tenth Street, Philadelphia, Pa.

Entered at the Post Office at Philadelphia as second-class matter

Our Readers will find it to their advantage to carefully consult the advertising pages when desiring to correspond with STRICTLY FIRST-CLASS PARTIES

BUSINESS HELPS FOR ALL PHARMACISTS

THE DOUBLE COLUMN

UNITED STATES DISPENSATORY

EDITED BY WOOD, REMINGTON, AND SADTLER

NINETEENTH EDITION

This masterpiece has received more approving comments than any previous edition. It is up-to-date, filled with information of a kind needed in the everyday work of the pharmacist, and includes the Pure Food and Drugs Act decisions.

Imperial 8vo. Cloth, $7.00; Sheep, $8.00; Half Russia, $9.00. Patent Index, 50c. additional.

FIFTH EDITION

REMINGTON'S PHARMACY

BASED ON THE U. S. PHARMACOPOEIA (8TH REVISION)

BY JOSEPH P. REMINGTON, PH.M., PHAR. D., F.C.S.

A treatise on the modes of making and dispensing official, unofficial, and extemporaneous preparations, with descriptions of their properties, uses, and doses. OVER 800 ILLUSTRATIONS.

1541 Pages. Large 8vo. Cloth, $6.00; Sheep, $6.50; Half Russia, $7.00.

TABLET MANUFACTURE

BY JOSEPH B. WOOD, M.A., PH.G.

This volume has been written, from knowledge gained by the author through many years of practical experience, to meet the needs of pharmacists who manufacture tablets, either in large or small quantities.

32 Illustrations. 12mo. Waterproof Cloth, $2.00 net.

ORDER FROM YOUR WHOLESALE DEALER, OR THE PUBLISHERS

J. B. LIPPINCOTT COMPANY, PHILADELPHIA

American Journal of Pharmacy

ESTABLISHED IN 1825

Four preliminary numbers were published at different times until in 1829, when the publication of the regular volumes began. Since then the publication has been uninterrupted. During the period from 1829 to 1852 four numbers were published annually, except in 1847, when five numbers were published. From 1853 to 1870 six numbers were published. Since this time twelve numbers have been published annually.

Manuscripts should be sent to the Editor. It should be stated *in* this connection that the Editor does not assume any responsibility in connection with the views or investigations of contributors, other than to exercise general care in the selection of matter.

Contributors are allowed a reasonable number of copies of this JOURNAL, free of charge, if applied for when the proof is returned.

Reprints, if desired, must be applied for when the proof is returned. The table below shows the *approximate* cost of reprints, the make-up of the pages to be identically the same as in the JOURNAL. The actual cost may vary from the figures given, and will depend upon the amount of presswork, paper, binding, etc. Reprints containing half-tones may be expected to cost somewhat more than the rates given.

	2 pp.	4 pp.	8 pp.	16 pp.	COVERS WITH TITLES
25 copies . .	$2.25	$3.75	$7.75	$9.00	25 copies . . $1.75
50 " . .	2.50	4.00	8.25	9.75	50 " . . 2.00
100 " . .	2.75	4.25	9.00	10.75	100 " . . 2.25
250 " . .	3.75	4.75	10.00	12.00	250 " . . 2.75

THE AMERICAN
JOURNAL OF PHARMACY

NOVEMBER, 1916

A NEW METHOD FOR THE DETERMINATION OF VANILLIN IN VANILLA EXTRACT.

By Arthur W. Dox and G. P. Plaisance.

(Chemistry Section, Iowa Agricultural Experiment Station.)

The official method for the determination of vanillin in vanilla extract consists essentially in removing the alcohol, extracting the vanillin with ether, crystallizing it from the ethereal solution and weighing it directly, identifying the crystals if necessary by their melting point. This method was first proposed by Hess and Prescott.[1]

Modifications were subsequently introduced by Winton and Silverman,[2] and by Winton and Bailey.[3]

For details of manipulation reference should be made to the official methods of the A.O.A.C.[4]

The whole operation is rather lengthy and tedious.

Methods dependent upon the precipitation of vanillin by various reagents have been suggested but have not come into common use. Hanus[5] used m-nitrobenzoylhydrazide as a precipitant, and also platinic chloride[6] for estimating vanillin in the presence of piperonal. Moulin[7] converted the vanillin into a yellow methyl picrate and estimated it colorimetrically. More recently Folin and Denis[8] have devised a colorimetric method based upon the color obtained by means of phosphotungstic and phosphomolybdic acids.

The writers[9] have found that thiobarbituric acid in the presence

[1] J. Am. Chem. Soc. 21, 256 and 719 (1899).
[2] *Ibid* 24, 1128 (1902).
[3] *Ibid* 27, 719 (1905).
[4] Bur. Chem. Bull. No. 152, p. 146.
[5] Zeitschr. Untes. Nahr. Genussm 10, 585 (1905).
[6] *Ibid* 10, 657 (1900).
[7] Bull. Soc. Chem. 29, 278 (1903).
[8] J. Ind. Eng. Chem. 4, 670 (1912).
[9] Dox and Plaisance, J. Am. Chem. Soc. 38, 2164 (1916).

of 12 per cent. hydrochloric acid is a general reagent for the precipitation of aromatic aldehydes and have applied it to the quantitative determination of furfural.[10] Under these conditions vanillin gave with thiobarbituric acid an insoluble vermilion colored precipitate, which analysis showed to contain the percentages of nitrogen and sulfur required for the simple condensation product, 3-methoxy-4-hydroxybenzalmalonylthiourea. Since the reaction appeared to be practically quantitative, we decided to test out its possible application as a means of quantitatively estimating vanillin.

The first experiments were conducted with a standard solution of pure vanillin. Aliquots of this solution were precipitated with thiobarbituric acid in the presence of 12 per cent. hydrochloric acid. The total volume of the reaction mixture was 50 c.c. The precipitates were allowed to stand over night, then filtered on Gooch crucibles, washed with 50 c.c. 12 per cent. hydrochloric acid in small portions and finally with 20 c.c. of water. The results are set forth in the following table.

Vanillin taken g.	Wt. of precipitate g.	Vanillin recovered	Error mg.
.0200	.0330	.0180	−2.0
.0200	.0337	.0184	−1.6
.0200	.0336	.0184	−1.6
.0200	.0330	.0180	−2.0
.0500	.0877	.0480	−2.0
.0500	.0890	.0487	−1.3
.0500	.0885	.0484	−1.6
.0500	.0890	.0487	−1.3
.0500	.0888	.0486	−1.4
.0500	.0906	.0495	−0.5
.0500	.0900	.0492	−0.8
.0500+	.0890	.0487	−1.3
.0500+	.0890	.0487	−1.3

+Clarified with lead acetate.

In each case the filtrate was a lemon-yellow color, indicating that a small amount of the condensation product remained in solution. This observation is further substantiated by the fact that the vanillin recovered is somewhat less than the amount taken. The error is, however, quite uniform, regardless of the amount of vanillin taken, averaging 2.6 mg. of the condensation product or 1.4 mg. vanillin. It is apparent therefore that a solubility correction must be applied just as in the determination of furfural by the official phloroglucinol method.

[10] Dox and Plaisance, *ibid* 38, 2156 (1916).

Before applying the method to the determination of vanillin in commercial vanilla extracts, where clarification is necessary, the use of lead acetate as a clarifying agent was tested. In the last two determinations in the above table, lead acetate was added and the excess removed from the filtrate by hydrochloric acid before adding thiobarbituric acid. The results are in close agreement with the other results, showing that the small amount of lead chloride remaining in solution does not interfere with the determination.

A sample of vanilla extract of known purity was next used. The procedure was as follows:—25 c.c. of the extract were dealcoholized in the usual manner, then transferred to a 50 c.c. standard sugar flask and filled to the mark with lead acetate solution. After standing for several hours at about 37° C. the contents of the flask were filtered through a dry filter. The filtrate was a straw color, indicating the absence of caramel as added coloring matter. 40 c.c. of this filtrate was then transferred to another 50 c.c. flask. Sufficient concentrated hydrochloric acid was added to bring the volume to 50 c.c. and the acidity to 12 per cent. After standing a few minutes the lead chloride was removed by filtration through a dry filter and 40 c.c. of the filtrate taken for the determination. On adding thiobarbituric acid in 12 per cent. hydrochloric acid solution, an orange colored precipitate resulted, indistinguishable in color from the product with pure vanillin. However, the color of the filtrate was somewhat darker than with vanillin alone, due no doubt to the original color of the filtrate after clarification. The precipitate was allowed to stand over night filtered on a Gooch crucible, washed with hydrochloric acid and water as in the previous determination and dried at 98°. The results were as follows:—

Vanilla extract taken c.c.	Aliquot % of extract taken	Wt. of precipitate g.	Wt. of precipitate corrected for solubility	Vanillin found in aliquot	Vanillin in 25c.c. extract g.	Vanillin in extract %
25	64	.0450	.0476	.0260	.0406	0.16
25	64	.0450	.0476	.0260	.0406	0.16
25	72	.0501	.0527	.0288	.0400	0.16
25	72	.0498	.0523	.0286	.0397	0.16
25	72	.0510	.0536	.0293	.0407	0.16
25	72	.0501	.0527	.0288	.0400	0.16
25	72	.0502	.0528	.0289	.0401	0.16
25+	80	.0890	.0916	.0501	.0626	0.25
25+	80	.0882	.0908	.0496	.0621	0.25

+ Not clarified.

The above method is not applicable to artificial extracts where caramel is added as a coloring matter, since caramel contains furfural derivatives which react with thiobarbituric acid. The absence of caramel should first be demonstrated qualitatively. When caramel is present, the filtrate after clarification is brown instead of straw-colored. A still more delicate test, described here for the first time, is the reaction with phloroglucinol. After clarifying and removing the excess of lead as chloride, phloroglucinol is added. In the presence of caramel a brown precipitate is formed. If caramel is absent, the vanillin gives a delicate rose pink color or a slight pink precipitate. Clarification of the sample is necessary, as shown by the fact that the two determinations without clarification gave high results.

SUMMARY.

Thiobarbituric acid, which is easily prepared from malonic ester and thiourea, may be used for the quantitative determination of vanillin in vanilla extracts which do not contain caramel as added coloring matter. When caramel is present it may easily be detected by the brown precipitate formed on the addition of phloroglucinol to the clarified extract containing 12 per cent. hydrochloric acid.

A METHOD FOR THE DETERMINATION OF SALOL AND ACETANILID IN A MIXTURE OF THE TWO, AND OF SALOL AND ACETPHENETIDIN IN THEIR MIXTURES.

By Benedict Salkover, B.Ch.E.

A method for the quantitative determination of both salol and of acetanilid in a mixture of the two, and of salol and acetphenetidin in their mixtures, whether occurring in tablet or powder form, is essential to the pharmaceutical chemist. The various chemical methods which have been proposed are long-involved, time-consuming, and contradictory. The length of time consumed in the painstaking performance of these processes is more than the commercial chemist has at his disposal.

A very simple and efficient method for the foregoing analytical determinations has been devised and practised with consistent success in this laboratory. This method depends upon the fact that while salol, acetphenetidin, and acetanilid are very soluble in chloroform, salol only is easily soluble in petroleum-ether, experiments conducted by us showing that 100 c.c. of petroleum-ether dissolves only 0.015 gm. acetphenetidin and 0.022 gm. acetanilid. The exact procedure of the steps in the process is as follows:

A weighed quantity of the mixture to be analyzed (if this occurs in tablet form a suitable number of the tablets are crushed in a mortar to a fine powder) is brushed into a bottle, covered with a measured quantity of chloroform, and shaken for about one-half hour. An aliquot part of the chloroform extract is filtered into a tared Erlenmeyer, the chloroform is volatilized on a steam- or water-bath, a spray trap being used to prevent loss of the substance to be determined, and the residue is dried at 60° C. to constant weight. By this means the amounts of salol and acetanilid, or of salol and acetphenetidin, present in the mixture can be determined.

Another weighed amount of the mixture is brushed into a bottle, and, in order to determine the salol present, a convenient volume of petroleum-ether (boiling at 40° to 45° C.) is added, and the bottle is shaken for about one-half hour. An aliquot part of the petroleum-ether extract is filtered into a tared Erlenmeyer and is evaporated upon a steam- or water-bath, a spray trap here also being used. The oily salol residue is dried at 50° C. to constant weight. By subtracting the correction for the solubility of acetanilid or of acetphenetidin in petroleum-ether, depending upon which occurs in the mixture, the salol content is determined. The amount of acetanilid or of acetphenetidin present can be determined by difference.

Experiments have been carried on in this laboratory which have proved that the presence of materials usually occurring in tablets, viz., talc, starch, acacia, tragacanth, etc., has no effect whatever upon the accuracy of the method.

Laboratory of the Wm. S. Merrell Chemical Company,
Cincinnati, Ohio.

THE VASCULAR ANATOMY OF PIPER METHYSTICUM.[1]

CONTRIBUTIONS FROM THE HULL BOTANICAL LABORATORY 218.

By Rachel E. Hoffstadt.

(With Twenty-three Figures.)

Historical.

Linnæus placed the Piperáce in the monocotyledons among the Aroidaceæ; Jussieu held that they were near the Urticaceæ; Kunth [3] and Blume ranked them with the monocotyledons. De Candolle,[4] however, following Jussieu, stated that the embryo characters indi-

[1] Reprinted from *The Botanical Gazette*, lxii, 1916, pp. 115–132.

cated their dicotyledonous character, Engler and Prantl[5] put the tribe Piperales among the lower Archichlamydeæ. Included in it are 4 families: Saururaceæ, Piperaceæ, Chloranthaceæ, and Lacistemaceæ. The genus *Piper* contains over 1000 species. Miquel[10] separates 7 species from the original classification on the basis of the presence or absence of his so-called "stipula oppositifolia" and persistence of the petiole. Among these is *Piper methysticum* Forst., which he calls *Macropiper methysticum.* Engler and Prantl,[5] using as a basis of their classification of these two genera the method of branching in the floral regions, retain the name of Forster.

Piperaceæ have attracted much attention because of their anomalies, both in anatomical and reproductive features. The former have been described in many species. Miquel[10] asserted that the internode of the stem ends blindly in the petiole, and the next internode develops from a bud between the petiole and the end of the foregoing node. He stated also that there are alternate, opposite, and whorled leaves on the same branch. The latter he concluded were atrophies, and the number of internodes which would have been produced would have been the same number as the whorls of leaves. Sanio[11] described in detail the structure and the course of the bundles in the stem of *Peperomia blanda.* Schmitz[12] verified the work of Sanio in *Peperomia.* He concluded that the peripheral bundles in *Piper* were joined at their base with the inner bundles of the stem. The small bundles of the leaf trace come from branches of the peripheral bundles. They, as well as the central bundles, go with or without branching into the petiole, which is merely a continuation of the stem.

In an elaborate discussion of the vascular anatomy of the Piperaceæ, Weiss[19] deals with 11 species of *Peperomia* and 8 of *Piper,* and draws the conclusion that in the Piperaceæ there is a transition from the monocotyledonous to the dicotyledonous type of bundle.

By far the most detailed account is that of De Bray.[3] He used 4 species of Saururaceæ, 16 species of *Piper,* 3 species of *Artanthe,* and 11 species of *Peperomia.* In *Piper* he found 2–4 rings of bundles arranged in two systems, the peripheral and the pith systems. The peripheral bundles are of two sizes; the outer ring is completed by an interfascicular cambium; the leaf trace comes from a peripheral ring, which in the node below is a branch of the central bundles; the vascular supply of the axillary buds is

from both peripheral and central bundles. He compares the families of the group, but shows no relationships.

In Van Tieghem's [17] work on the mucilage canals of *Piper* he describes in detail the stem of *Piper nigrum.* He found that there are two circles of bundles; that the pericycle becomes lignified late in the growth of the stem; that the cambium for a long time cuts off segments only on the side toward the pith, and may cut off very late a few segments on the other side; that the mucilage canals vary in location with different forms and are not continuous

FIG. 1.

Piper Methysticum growing in Samoa.

through the nodes; and that the canal of the petiole is not continuous with that of the branch.

The present study of *Piper methysticum* was taken up with the idea of giving a modern interpretation to the vascular structure, and to ascertain whether the stem keeps pace with the gametophyte of the group.

MATERIAL.

I am indebted to Dr. W. J. G. Land for the material for this study. It was collected on the Island of Tutuila, Samoa (Fig. 1). The plant is a native of the South Sea Islands, and is commonly

called *Ava* or *Kava*, the natives extracting from its roots the national beverage bearing that name.

It becomes a shrub 1–1.5 m. in height and is propagated mostly by cuttings. No seedlings were obtainable. The leaves are ovate, 18–25 cm. in diameter, with a deep cordate base and a short acuminate apex. The blade is bright green, smooth above, and bears fine multicellular hairs on the veins beneath. It is distinctly petioled, the petiole having a sheathing base and a deciduous stipule. The leaves are alternate and the dense flower clusters are borne opposite them. The internodes are 7–10 cm. long, the nodes being swollen, smooth, and in the older ones irregularly spotted. Both old and young stems have an herbaceous appearance. The largest nodes examined were 2.75 cm. in diameter, and the smallest were 2 mm.

For the sake of comparison *Piper umbellatum* (*Heckeria umbellata* Kunth) was used, the material being obtained from plants brought from Mexico. In shape and size the leaves resemble those of *Piper methysticum*. The petiole has a sheathing base; the nodes are swollen and marked with several distinct rows of spots; the internodes are 5–9 cm. long and when young are covered with dense rows of hairs, giving a ridged appearance; the older internodes are smooth but spotted.

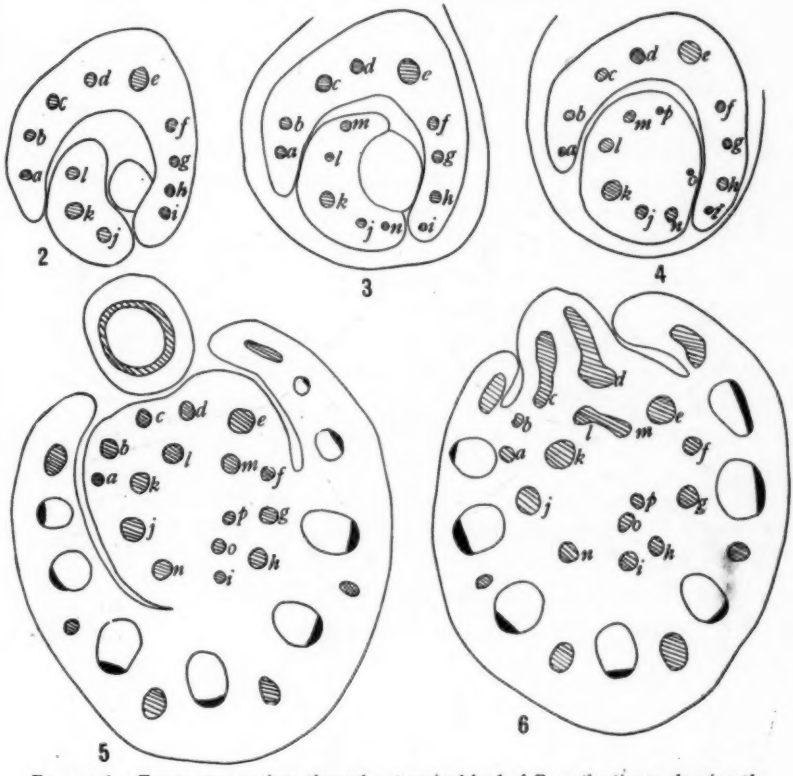
The younger stems and nodes were cut in paraffin at 25–30 μ and complete series obtained. The largest stems and nodes were treated with hydrofluoric acid for one week and then sectioned at 30–50 μ with a sliding microtome, in this case also the series being complete. The safranin Lichtgrün stain was used.

Origin and Course of Stem Bundles.

The stem of *Piper methysticum* contains at maturity three rings of bundles, one peripheral and two within the pith, the bundles being foliar. The terminal bud is enveloped in the sheathing base of the youngest leaf. In some cases a bud was found within the sheath of a single leaf with as many as 3 leaves, each of which was inclosed in the base of the petiole just beneath it.

The leaf primordium appears on the stem tip early and forms about it a semicircle, and 5–7 procambial strands are soon differentiated. These connect with the first strands of the stem (Figs. 2–4, *j–p*). Strands *j–p* are the strands of the youngest leaf (node 1); *k* is the first to be differentiated; *j* and *l* follow quickly; *o* and *p*

come last. The bundles of the second leaf (node 2) are represented by the series *a–i*. At node 1 the stem contains a single row of scattered bundles. These bundles (*j–p*) become the inner bundles of the stem at node 2, and *a–i* of 2 become the peripheral bundles (Fig. 5). Through the following internode these two sets of bundles run approximately parallel and become the inner rings of

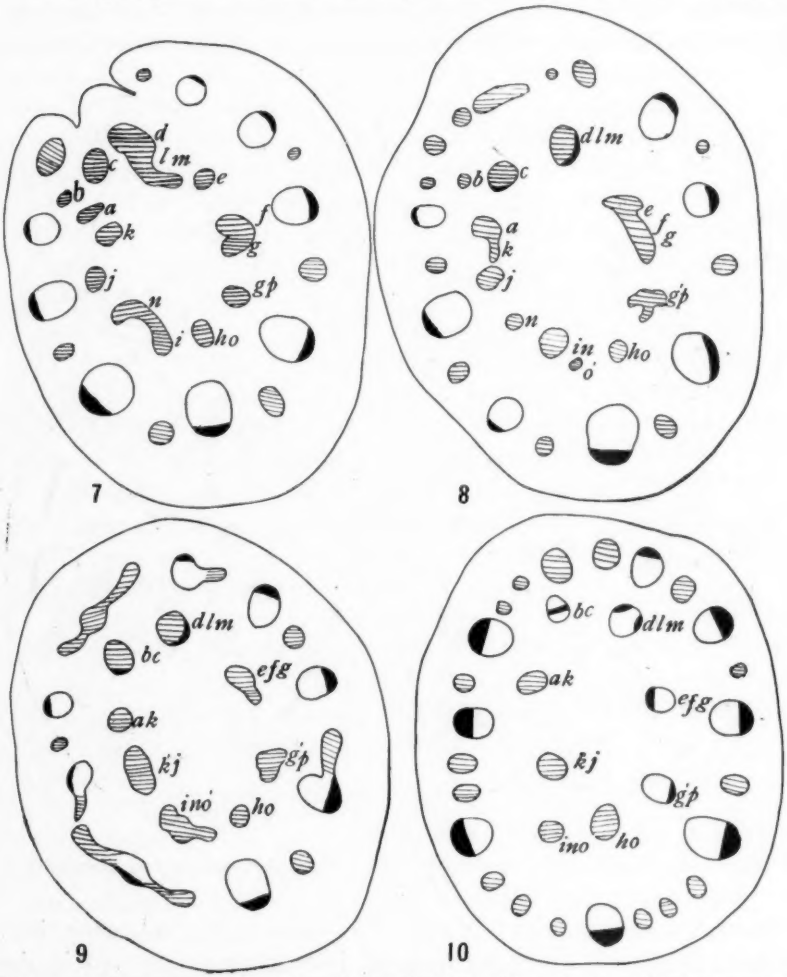


FIGS. 2–6.—Transverse sections through a terminal bud of *P. methysticum*, showing the course of the bundles; × 168.

the next node (node 3, Fig. 6). The union of the two inner rings takes place here. Five methods of joining were observed in the case of the undifferentiated strand: (1) two strands from the same ring may join (Fig. 8, *lm*); (2) two strands from different rings (Fig. 7, *ak*); (3) one strand may divide and join a strand of a different ring (Fig. 8, g^1p); (4) two strands from the same or different rings may unite and then join a branch of a strand from

either ring (Fig. 9, *efg, ino*); (5) three strands may join, the result of this, for a short time, being a single inner ring (Fig. 9, 10, *dlm*).

The peripheral bundles at any node may branch. In older



FIGS. 7–10.—Transverse sections through a terminal bud of *P. methysticum* showing course of bundles; sections follow those in Figs. 2–6; × 168.

nodes this branching may occur just before the peripheral bundles become pith bundles, and part remain in the peripheral ring; the latter will then connect with the bundles of the leaf at the node below (Fig. 19).

The coalescence of the branches of these bundles does not always occur at the node, but may occur above or below it, as follows: (1) branches of the same bundles may join before passing through a node; (2) branches from different bundles may unite; (3) branches of a peripheral bundle of the internode above may join a peripheral bundle of the internode below. Not infrequently strands isolated in the anastomosing of the pith bundles at any node may join the peripheral bundles at that node. The peripheral bundles of any internode, therefore, when young will consist of one set of foliar bundles only; and when older may contain portions of the foliar bundles of the leaves of 3 nodes.

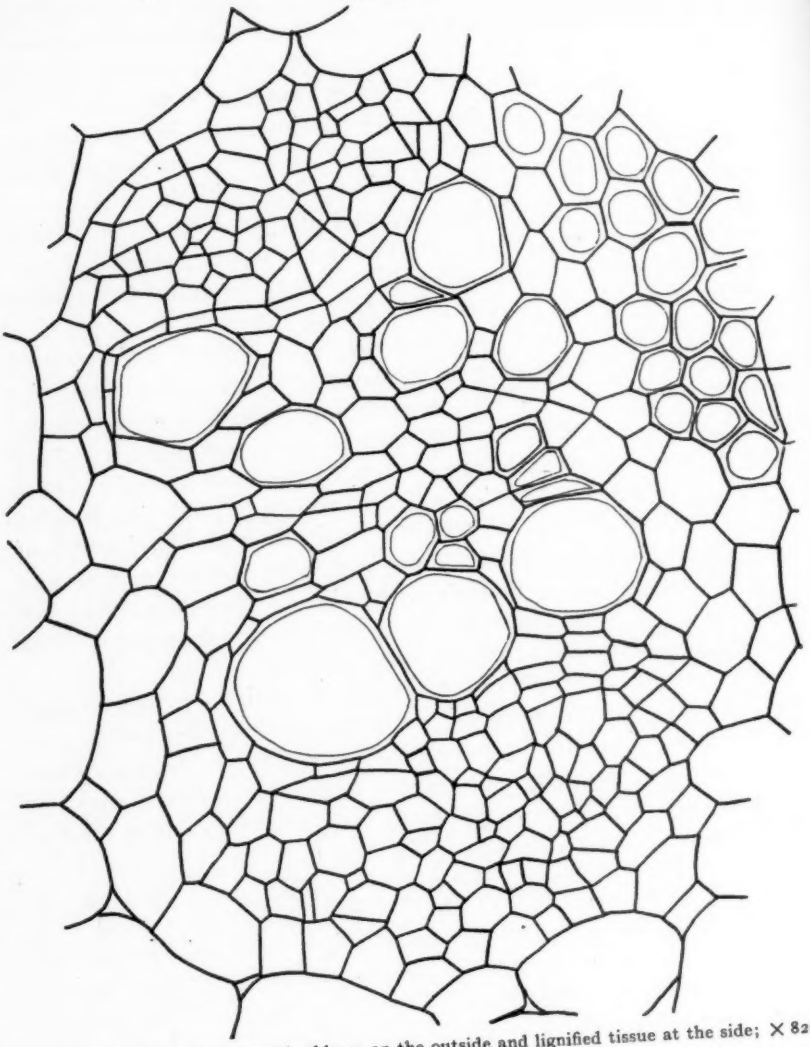
The node in which the strands have become differentiated presents a most complicated appearance. One often finds for a short time xylem entirely surrounding phloem, and vice versa. Bundles may join with either the phloem or xylem together. They may lie side by side and union may occur either in the xylem or in the phloem. Not infrequently the xylem of two bundles may unite, and the phloem of a third join the phloem of either of the others. Strands become separated from bundles and several of these may coalesce to make a bundle, or they may join with other bundles. One often gets cross-sections and longitudinal sections of the same bundle in the same section.

The bundles in one internode are in the periphery, and through the following two internodes are pith bundles. The position in the pith often gives the appearance of two complete rings and one-half of a third ring, when the number of bundles is large; but careful study shows that there are really only two rings. The number of bundles reaches 45–50 in the pith.

Description of Stem in Detail.

As previously stated, the stem of *Piper methysticum* has two sets of bundles which may be designated as the peripheral ring and pith or medullary rings, two in number, and an irregular half-ring which gives the appearance of a third ring at times. The bundle type is open collateral endarch, oriented for the most part in the usual manner. Sometimes, however, one finds the protoxylem points appearing in reverse orientation (Fig. 10, *e–g*). Union is often incomplete and one finds double bundles persisting in the internode, and these may be of two types. The xylem points or the phloem points may be together (Figs. 11, 12).

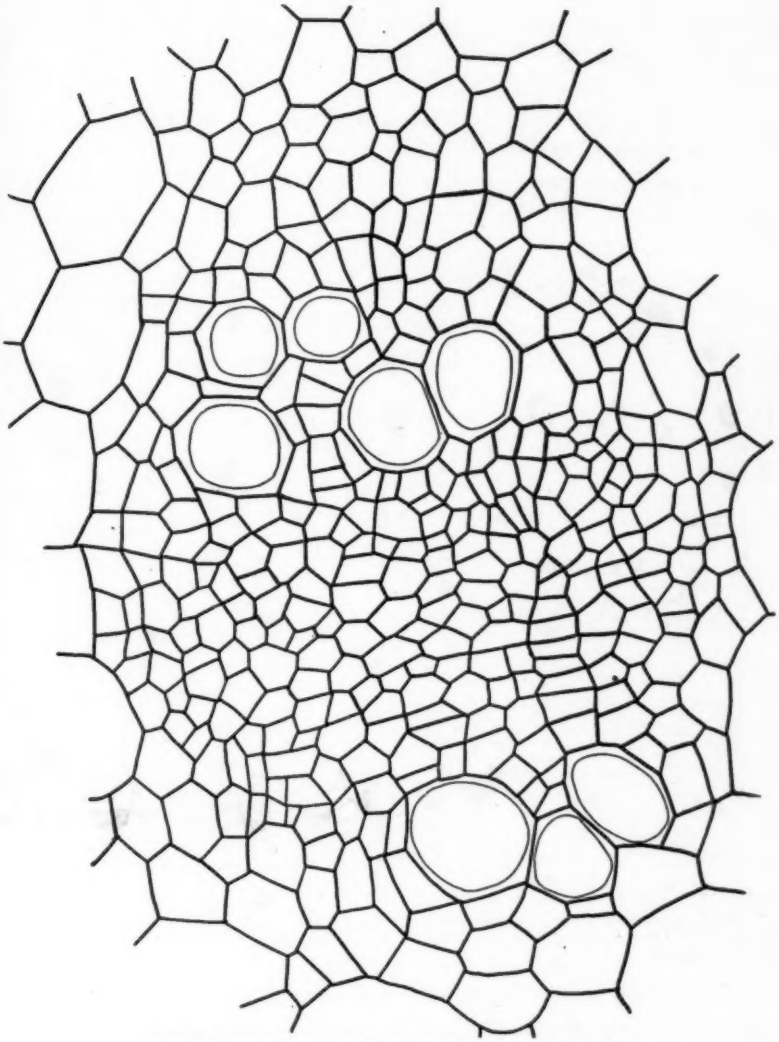
FIG. 11.



Detail of a double bundle with phloem on the outside and lignified tissue at the side; × 820.

The peripheral ring of bundles is formed of two sizes: the primary, those differentiated first; and the secondary, termed supplementary by De Bray[3] (Fig. 13). The secondary bundles are branches of the primary bundles and lie between them. More than one primary bundle may contribute to a secondary one

FIG. 12.



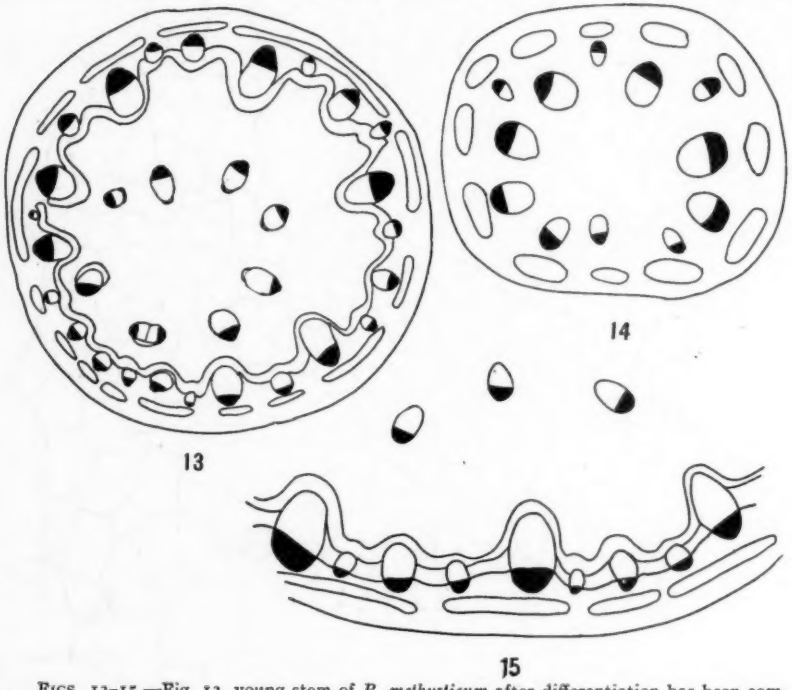
Detail of double bundle with xylem points outside; × 820.

(Fig. 9); that is, two bundles may branch and the branches join. The number of secondary bundles varies from none to 3, according to the age and size of the stem. Near the tip there are none (Fig. 4), as observed by Schmitz.[12]

The inner rings of bundles are approximately the same size.

This does not differ from the majority of the species of *Piper*. Between the pith and the peripheral ring of bundles in the young stem is a continuous band of parenchyma, 4–6 rows thick, which early becomes lignified (Figs. 13, 14). Later, owing to growth of the bundles, this band is broken and patches appear only at the inner portions of the bundles (Fig. 18).

The pericycle consists of only a few cells (Fig. 16) just outside the bundles in both the peripheral and pith systems, and nowhere



FIGS. 13–15.—Fig. 13, young stem of *P. methysticum* after differentiation has been completed, × 80; Fig. 14, petiole, × 101; Fig. 15, sector of stem after interfascicular cambium has been developed, × 101.

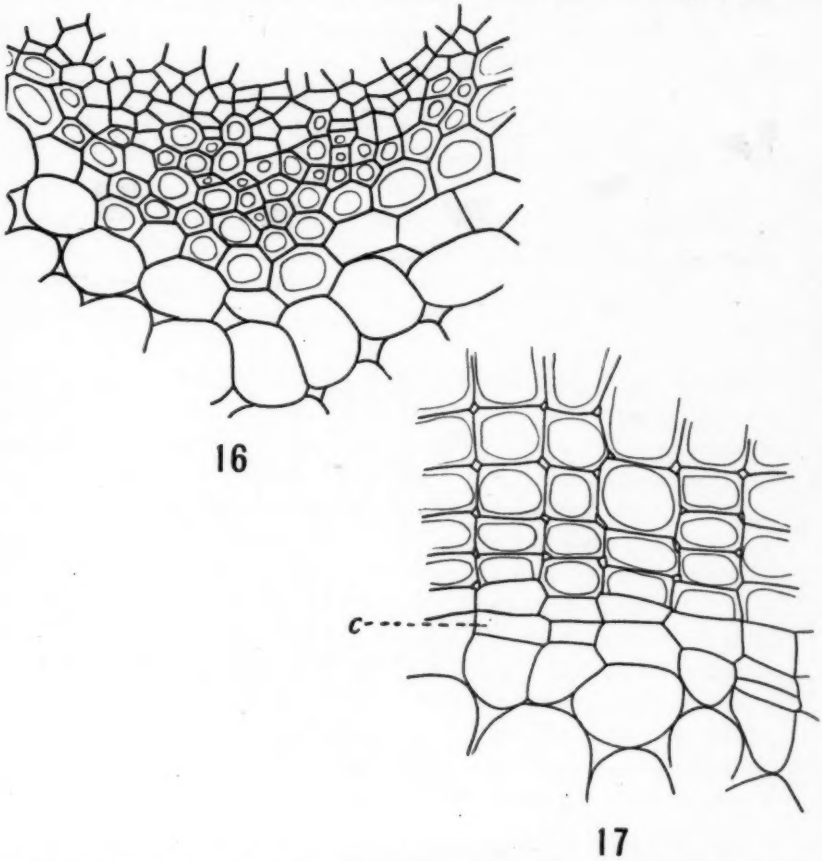
else. It can be distinguished easily in the young stems by the dense cell contents. Late in the history of the plant the pericycle becomes lignified. There is no differentiated endodermis in either old or young stems.

In the cortex of the young stem is a continuous band of tissue 7–8 cells wide, which responds to the test for suberin (Tunmann [16]). This is in patches in the older stems. The intercellular spaces of the pith are very large.

Secondary Activity in the Stem.

There are two methods by which the stem of *Piper methysticum* enlarges: (1) by active division of pith cells; (2) by cambial activity.

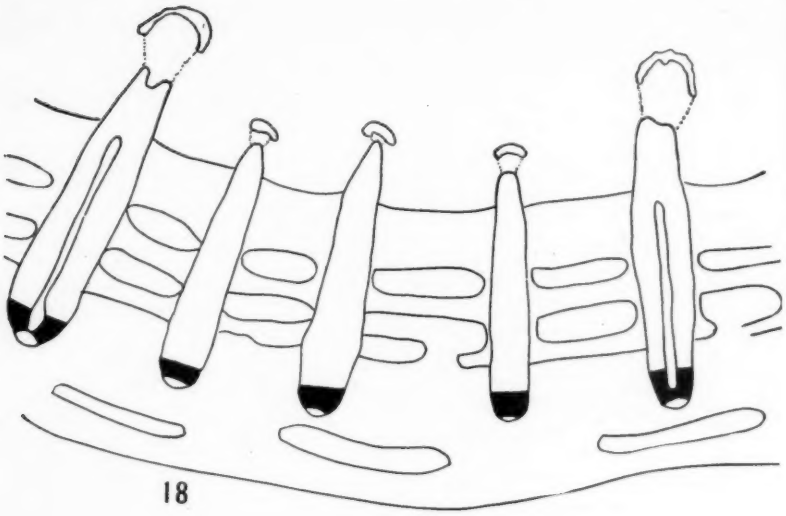
1. In the center of and at regular intervals throughout the



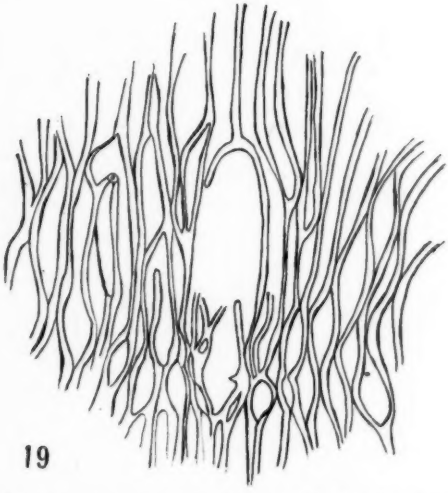
Figs. 16, 17.—Fig. 16, detail of pericycle of *P. methysticum*. Fig. 17, detail of medullary ray; C. cambium; × 820.

pith, groups of cells will divide actively throughout the internode.

2. Each bundle of both the peripheral and pith rings has a cambium. The inner ones do not enlarge greatly. The outer or peripheral bundles lay down a ring of wood often 4–5 mm. in thickness. The proportion of xylem to phloem is about 8:1 (Fig. 18).



18



19

FIGS. 18, 19.—Fig. 18, section of peripheral ring of the bundles of *P. methysticum* at a mature node, showing banded appearance of the rays, × 35; Fig. 19, tangential section of peripheral bundles, showing branch gap; × 7.

Late in the history of the stem an interfascicular cambium appears (Fig. 15), which cuts off segments on the inside only; very late a few segments may be cut off on the other side (Fig. 17). This closes the stem cylinder. The interfascicular cambium appears much later in the nodes and remains active much longer.

Van Tieghem calls attention to the one-sided action of the cambium in his work on *Piper nigrum.*

The medullary ray becomes lignified and in longitudinal section shows pitted cells. At the node in the largest stems available, cells next to the cambium do not lignify and remain active. These are also scattered at irregular intervals throughout the ray. In section this gives the ray an irregular banded appearance (Fig. 18). There are no growth rings. Much of the wood parenchyma touching the pith retains its activity at the node and divides long after secondary wood has been laid down. This pushes the primary vessels of the bundles apart at great distances, as well as the cells of mechanical issue (Fig. 18).

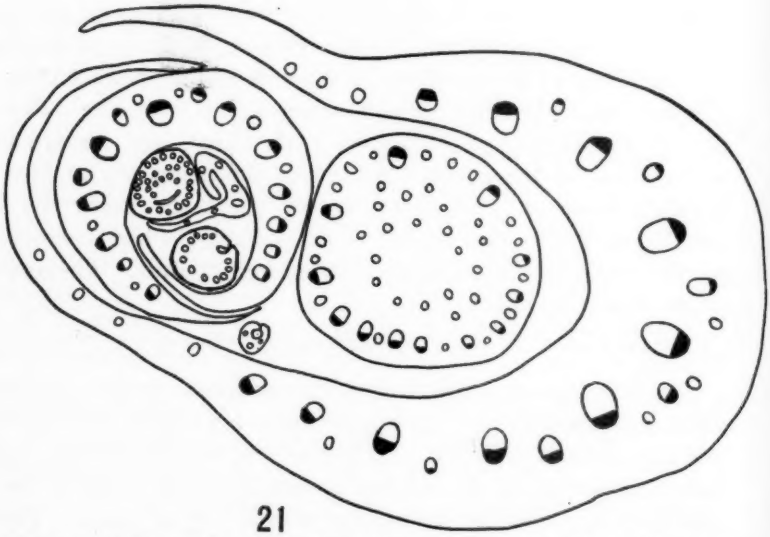
The stem when young is packed with starch and piperin. Mucilage cells are scattered throughout it, and the buds especially are covered with mucilage.

Leaves.

The leaves have distinct petioles, the sheathing bases of which extend entirely around the stem, which becomes narrow opposite the point of insertion of the leaf. The leaf traces vary in number from 7 to 14. The bundles may be of two sizes. The lower part of the petiole is flattened on one side; the upper part is circular. The bundles form a crescent in the lower portion of the petiole (Fig. 21), this crescent being made complete in the upper portion by the branching of the bundles at the points of the crescent (Fig. 14). The secondary bundles form a more or less complete outer ring, are of the same type as those of the stem, and anastomose at any portion of the petiole. Union of the primary and secondary bundles, however, takes place before the traces enter the blade, which has 7–9 strong palmate veins, the 3 median ones running parallel for a while before they swing out laterally. The vernation of the leaf is involute.

Branching.

Buds are borne in the bases of the sheathing petiole, the number varying from 1 to 3. The appearance of a single bud is often to one side instead of in the median position, which probably accounts for the appearance of branches coming from the side of the leaf. The buds are invested by a large amount of mucilage. The central bundles of the branch connect with those of the stem, and



FIGS. 20, 21.—Fig. 20, transverse section of mature and young buds, × 32. Fig. 21, transverse section through the base of the petiole, showing branches arising in axils of abortive leaves, × 28.

the peripheral ones connect with the peripheral bundles of the stem (Fig. 20). In two cases it was observed that the branch did not develop in the axil of a leaf where only the blade was developed (Fig. 21), which was due probably to the pressure caused by the enveloping sheaths of the preceding leaves.

Piper Umbellatum.

The stem of *Piper umbellatum* is not essentially different from that of *Piper methysticum*. At maturity it has only one ring of pith bundles. The bundles, instead of traversing two nodes as internal bundles before fusing with the next group, traverse but one (Fig. 22). The young plants are covered with hairs, both unicellular and multicellular. The number of leaf traces is 7–9. In the young stem there is an abundance of mucilage scattered in all regions. In the old stem a single mucilage canal appears in the center, which is continuous through the nodes and in the branches; Van Tieghem found none that was continuous through the nodes (Fig. 23).

Summary.

1. The stem of *Piper methysticum* consists of two systems of bundles, peripheral and pith, the latter being in two rows.

2. The peripheral bundles are of two sizes: primary, the larger; secondary, the smaller. The latter are branches of the former.

3. The bundle type is collateral endarch.

4. The bundles are of foliar origin.

5. The bundles, after entering the stem, remain in the peripheral region through one internode and then traverse the pith for two internodes.

6. Both the peripheral and the pith bundles show anastomoses.

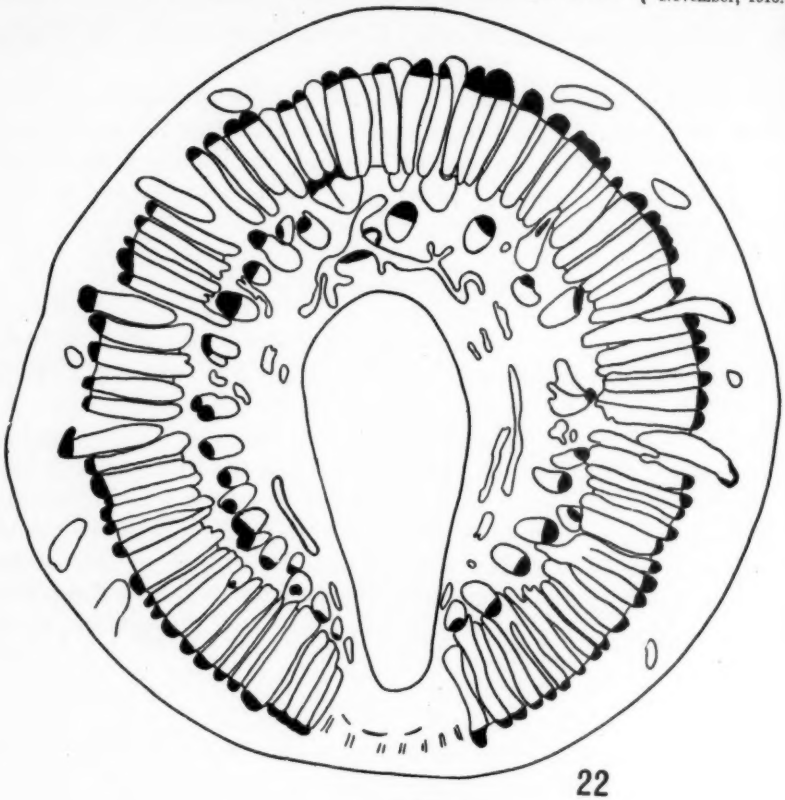
7. The pericycle consists of only a few cells outside the bundles, which become lignified.

8. There is no differentiated endodermis.

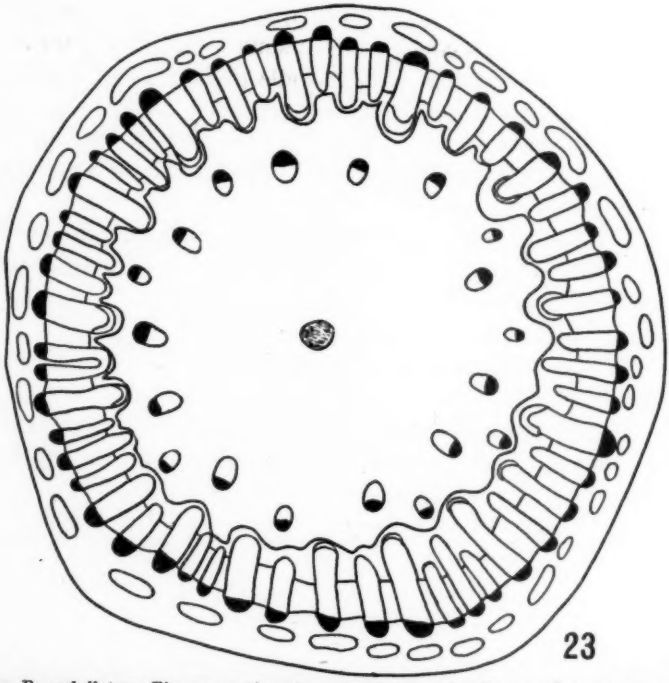
9. The stem enlarges by cambial activity and divisions in the pith region.

10. An interfascicular cambium appears late in the internode and cuts off segments only on one side; it comes still later in the nodes.

11. Leaf traces are many.



22



23

FIGS. 22, 23.—*P. umbellatum*; Fig. 22, section through mature node; Fig. 23, section through internode; × 12.

12. The base of the leaf is sheathing and vernation is involute.

13. Buds vary in number and position.

14. *Piper umbellatum* differs from *Piper methysticum* in the following ways: (1) one ring of pith bundles only; (2) the mucilage canals runs through the center of stem and node; (3) the bundles run through one internode only in the periphery and one in the pith before fusing with those of the leaf above.

15. Both stems are packed, especially when young, with starch, piperin, and mucilage.

16. There are no growth rings.

Discussions and Conclusions.

The anatomy of *Piper methysticum* and of *Piper umbellatum* agree for the most part with the anatomy of the species of *Piper* already described; especially is this true in reference to the work of De Bray,[3] see also de Bary.[2] Van Tieghem reports a differentiated endodermis in all species of *Piper,* but this was lacking in these forms.

The question of most importance is the relationship shown by these forms. Sinnott and Bailey[13, 14] assert that the most primitive condition of angiosperms was woody, and that there is a tendency toward the herbaceous habit in the more recent groups. These forms show a tendency toward elimination of secondary growth and a breaking up of the woody cylinder in the following characters: (1) the pericycle is broken and all that remains is a small patch outside of each bundle; (2) the interfascicular cambium appears late in the internode and still later in the nodes; when it does occur the activity is primarily on one side; (3) there is a tendency toward the scattering of the bundles in the pith. These, together with the sheathing base of the petiole, the multilacunar (Sinnott[13]) type of node, and the anastomosing of the bundles at the side, show a monocotyledonous tendency. Moreover, the embryo sac of the group shows the elimination of one division in oogenesis.

One may conclude from this combination of characteristics that *Piper methysticum* and *Piper umbellatum* lie in a group well toward the level of monocotyledons, and the conclusion is borne out by the female gametophyte.

The writer is indebted to Professor John M. Coulter for suggestions and criticisms, and to Dr. W. J. G. Land for the material used and for direction and encouragement during the investigation.

University of Chicago.

Literature Cited.

[1] Campbell, D. H., On the affinities of certain anomalous dicots. Amer. Nat. 37: 7-12. 1902.

[2] De Bary, A., Comparative anatomy of phanerogams and ferns. Eng. ed. 1884.

[3] De Bray, F., Étude comparative des caracters anatomiques et du parcours des faisceaux fibrovasculaires des Piperacées. Thèse. Paris. 1886.

[4] De Candolle, C., Mémoire sur la famille des Piperacées de Genève. 1886.

[5] Engler, A., and Prantl, K., Die Natürlichen Pflanzenfamilien 3: 5–11. 1894.

[6] Jeffrey, E. C., Morphology of the central cylinder of angiosperms. Trans. Can. Inst., 6: 1-40. 1900.

[7] Johnson, Duncan S., On development of certain Piperaceæ. Bot. Gaz. 34: 321-340. 1902.

[8] Kunth, C., Sur les Piperacées. Ann. Sci. Nat. Bot. 2:173–220. 1840.

[9] Miquel, F., Sur les genres de la famille des Piperacées. Ann. Sci. Nat. Bot. 2: 164-173. 1840.

[10] ———, Systema Piperacearium. Rotterdam. 1843.

[11] Sanio, C., Über endogene Gefassbündelbilung. Bot. Zeit. 22:193-216. 1864.

[12] Schmitz, F., Fibrovasalsystem im Blütenkolben der Piperaceen. Essen. 1871.

[13] Sinnott, E. W., Investigations on the phylogeny of angiosperms. 1. Anatomy of the node as an aid in the classification of angiosperms. Amer. Jour. Bot. 1: 303-321. 1914.

[14] Sinnott, E. W. and Bailey, I. W. *idem.* 3. Nodal anatomy and morphology of stipules. Amer. Jour. Bot. 1: 441-443. 1914.

[15] ———, Foliar evidence as to the ancestry and early climatic environment of angiosperms. Amer. Jour. Bot. 21:1-20. 1915.

[16] Tunmann, O., Pflanzenmikrochemie. 1913.

[17] Van Tieghem, Ph., Traité Botanique. 1874.

[18] ———, Sur les cannaux à mucilage des Piperées. Ann. Sci. Nat. Bot. 9:116-127. 1908.

[19] Weiss, J. E., Wachstumsverhältnisse and Gefässbündelverlauf der Piperaceen. Flora 21: 321-383, 22: 334-337, 23: 353-362, 24: 385-392, 25: 401-410. 1876.

FIFTY YEARS OF MANUFACTURING PHARMACY AND BIOLOGY.

The Story of Parke, Davis & Company.

The House of Parke, Davis & Company was born in a drug store.

It was not an easy beginning. No experience could surpass in difficulty the almost ceaseless trials of a manufacturing house endeavoring to come into existence fifty years ago. It had first to justify its being. It represented a new idea—and new ideas are ever accepted reluctantly by an unwilling world which clings fast to the old forms.

Dr. Samuel P. Duffield was both a physician and a pharmacist. First trained as a doctor of medicine, he later on attended and was graduated from the University of Giessen in Germany, and there he became deeply interested in the subject of chemistry. He returned to Detroit—the home of the Duffields—and opened a drug store. Soon he developed a small manufacturing business, and called particular attention to his "Ether, Sweet Spirit of Nitre, Oil of Wine, Hoffmann's Anodyne and Blue Pill Mass." This unpretentious announcement was the faint birth-cry of a new industry.

Dr. Duffield's equipment consisted of a still capable of turning out two barrels of alcohol a day, an iron ammonia apparatus, two ether stills, a drug mill and a hydraulic hand press. This was in 1862.

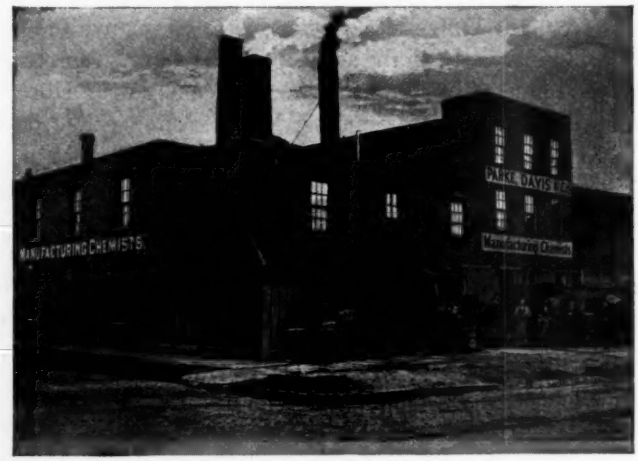
Early Struggles.

The struggles of the next few years may be imagined but can scarcely be described. Dr. Duffield was breaking new ground in more ways than one. Manufacturing pharmacy as he visioned it did not exist, and it had slowly and painfully to prove its right to a place in the sun. Detroit, moreover, was considered in the more populous East to be pretty much in the class of a backwoods settlement, and what good could be expected to come out of Nazareth? The meager shipping facilities then afforded were a grievous handicap. Capital was hard to get. Obstacles and difficulties of a hundred kinds were encountered. Temptations arose on every hand.

All this was reflected, in a way, by Dr. Duffield's frequent change of partners. Associates came and went, one after another, and it was not until 1866 that something like permanence was suggested. In that year Hervey C. Parke was induced to join forces with Dr. Duffield, and the firm name of "Duffield, Parke & Co." was painted on the

building. This change of partnership was effected on October 26, 1866—the date we look back upon as signalizing the real beginning of the House as it exists today.

It was only a year later when George S. Davis cast in his fortunes with the enterprise, and with the introduction of both Parke and Davis a new era was promised. Entirely unlike, these men were singularly adapted to supplement each other's abilities. George S. Davis was a creative genius. Great industry, boundless driving power, a rare gift for discovering, developing and organizing talent, a capacity to probe the future and perceive tendencies as well as conditions—these powers, united with Mr. Parke's winning manners and great

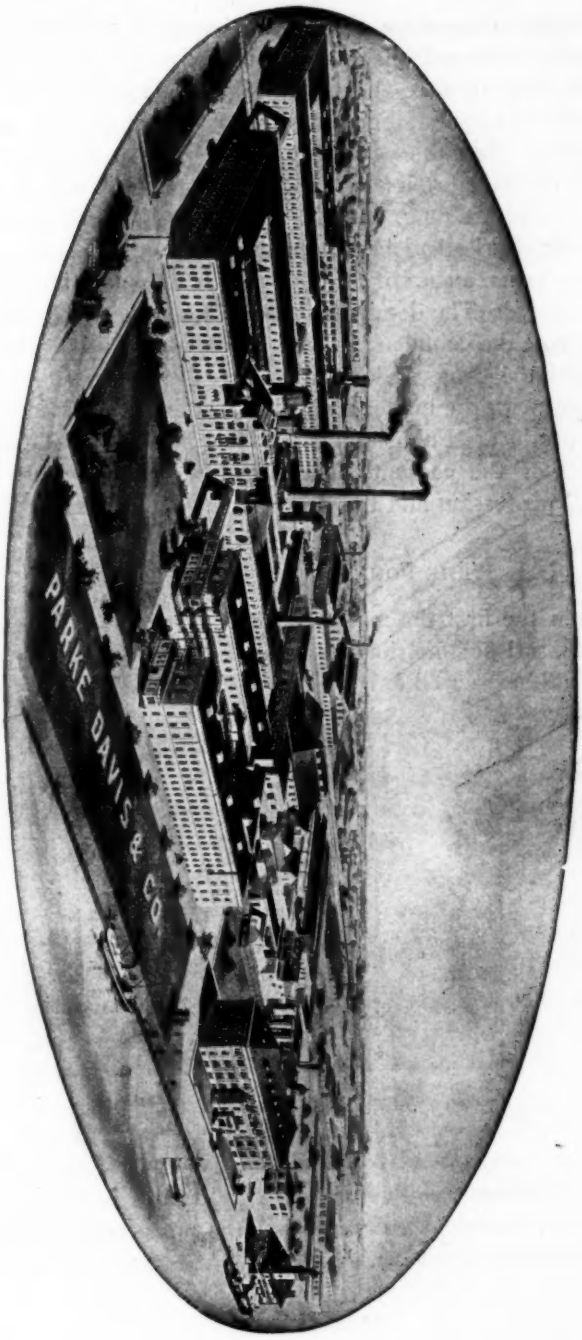


THE BEGINNING IN 1866.

personal credit, were to carry the house through many a storm into a haven of assured and lasting success. Did they have any inkling of the destiny which was already hovering over them? Probably not. "None climbs so high as he who knows not whither he climbs." It is more than legend that during the early '70's both Parke and Davis were going about Detroit, seeking capital for the development of their new enterprise and finding it almost impossible to obtain.

Early Policies.

But they would not accept defeat. Possessing youth, vigor, ambition, determination, they struggled on amid a host of difficulties, and as the business grew they were in time enabled to move the plant from



GENERAL OFFICES AND LABORATORIES, DETROIT, MICHIGAN, U.S.A.

its original drug-store site to a laboratory specially built on the grounds of the establishment as its exists to-day. This was done just in time to face the panic of '73. How that was weathered heaven only knows! For years the grim fight for bare existence was prolonged. But the year 1877 marked the turning point and witnessed the first profits ever earned by Parke, Davis & Company—fifteen years after Dr. Duffield had begun his work and eleven years after Mr. Parke had become connected with the enterprise!

Now began an era of wonderful growth, marked by bold and original methods. The dominating thought became: "Gain and preserve at any cost the confidence of the best element in the medical profession and the drug trade. Appeal to the physician by methods in harmony with the higher traditions of medical practice. Market no secret product. Publish on every label the exact medicamental composition of the contents. Confine the advertising strictly to the medical profession and the drug trade. Build well to last."

The Foundation: Research Work.

From the first the management realized the vast importance of friendly, satisfied distributors, wholesale and retail. Their co-operation could be assured only by a just, living profit on the preparations

RESEARCH LABORATORY.

sold, and by a constantly increasing demand. How create the demand? Obviously, by genuine scientific work worthy of the name, and by the assiduous cultivation of the physician, the fountainhead of all demand.

Research work, indeed, became one of the fundamental ideals and purposes of the house. The founders realized that no institution can achieve a lasting success unless it represents some great idea. If it lack that it may progress for a time, but sooner or later it will be relegated to the oblivion whence it came—unwept, unhonored and unsung. From the very outset Parke, Davis & Company was dedicated to original scientific investigation on the one hand, and to absolute truth and integrity on the other. *"Medicamenta vera"* became the shibboleth of the house, and it was religiously observed amid all the struggles and temptations of the early years.

New Vegetable Drugs.

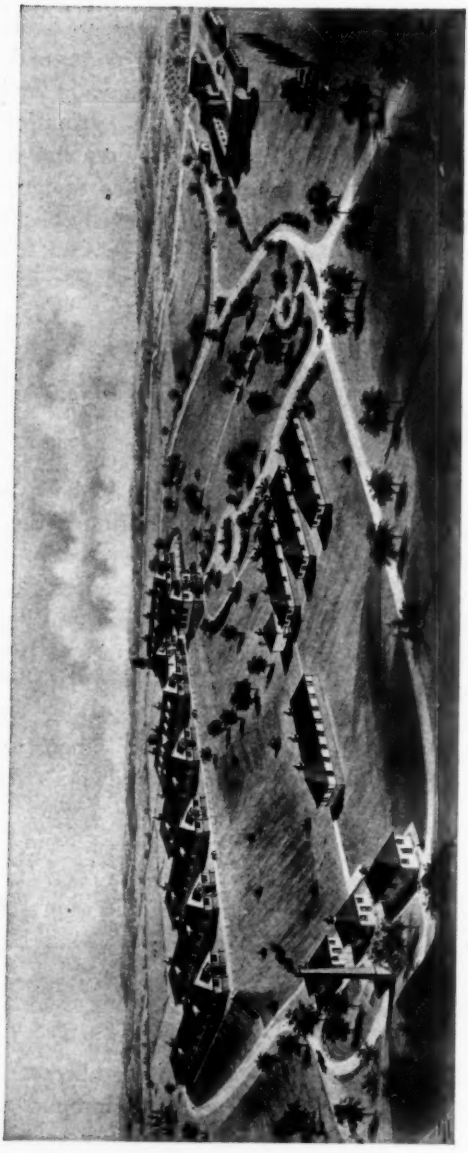
If manufacturing pharmacy was to succeed in those pioneer days, if it was to justify its right to existence, it could only do so by giving the world something which it needed and which it could not otherwise secure. New drugs; improved galenicals; agents more effective for the treatment of disease than had previously been available—the attainment of these objects became and continued the guiding purpose of the house.

It has been said that Mr. Parke joined the enterprise in 1866, and Mr. Davis in 1867. Within three years thereafter Viburnum Prunifolium was introduced to medicine. Guarana and Eucalyptus Globulus soon followed. Coca was presented to the medical profession in the early '70's, a number of years before Köhler discovered the anæsthetic property of the alkaloid cocaine. Then came drugs like Jaborandi, Grindelia Robusta, Jamaica Dogwood, Saw Palmetto, Convallaria, Pichi, Cocillana, Kamala and Areca Nuts.

These and other introductions were made at a time when poverty may be said to have been the daily lot of the concern, when failure was being faced almost hourly, and when it required the insanity of genius to look ahead to the future and to build well upon the foundation rock of human need.

Sounds Like Romance.

In 1877, after Parke, Davis & Company had become established in the new plant on the river front, a great triumph was achieved in the introduction of Cascara Sagrada—a drug now recognized in all the pharmacopœias of the world. Then followed a costly, energetic investigation of the medicinal flora of Mexico, the West Indies, Cen-



BUILDINGS AT PARKEDALE FARM.

tral America, South America and other foreign countries. Some of the incidents of those days sound like romance rather than stern reality.

In 1885 the distinguished botanist, Dr. Henry H. Rusby, was dispatched to South America to investigate the native drugs and to purchase large supplies of Erythroxylon Coca. The great difficulties of traveling, the pestilential diseases of the swamps, the opposition of hostile tribes—all these and a thousand other conditions have since been described many times by Dr. Rusby on the lecture platform, and one gets here but a faint glimpse of the almost insurmountable obstacles in the pathway of a manufacturing pharmacist during the early years.

Another scientific emissary in those days was Count Hansen, an intrepid explorer. The Count was once sent out by Parke, Davis & Company to secure shipments of Tonga from the Fiji Islands. Tonga had been used in British medicine, but supplies were not available for use in America. No adequate and thorough-going system existed then, as it does now, for the collection, shipment and distribution of crude drugs. One frequently had to go after them where they were supplied by nature, and wrest them often from a hostile and well-nigh inaccessible country.

Cutting Through the Jungle.

On this particular trip Count Hansen had made an engagement to meet a Fiji chief and his followers at an appointed place on a certain day. The Islanders were to proceed down the river in their war canoes. The Count was to travel on horseback. When he arrived within three miles of the trysting place his horse slipped into a concealed hole in the swamp, broke his leg and injured the rider's knee. Thereupon Count Hansen was literally compelled to cut his way through the jungle for three miles, proceeding as best he could with a wounded knee, and knowing well that if he failed to complete his appointment the natives would disappear and his trip would be in vain. He arrived before the day was out, finished his arrangements with the Islanders, stayed with them until he was able to travel again, and in due course of time the shipment of Tonga reached Detroit!

As the result of endeavors of this kind, carried on among difficulties that seem strange in this day and age, Parke, Davis & Company were enabled to secure and introduce new vegetable drugs to the

medical profession. The list was, indeed, a notable one. Many of them are now recognized in the United States Pharmacopœia or the National Formulary, and are almost household words the world over. To-day less emphasis is placed upon the vegetable materia medica, and to some degree the drugs then representing real additions to the armamentarium of the physician have been succeeded by chemical, biological and glandular products. In due course of time the House was to enter these fields of exploration as it had been a pioneer in the field of vegetable materia medica, but of that something will be said later on.

From the very first the results of investigation were published for the benefit of the medical profession. There was introduced and continued for a number of years a series of brochures known as "Working Bulletins." These pamphlets became the repositories of both old and new information about drugs on which the Scientific Staff was working at the time, and they were accepted as being the most exhaustive and complete presentations to be found in the literature. Even yet requests are made occasionally for some of these Bulletins, and it was only the other day that a department of the United States Government told a correspondent, anxious to secure historical and therapeutic information about some vegetable drug, that he would find the best treatment of the subject in one of Parke, Davis & Company's Working Bulletins published over thirty years ago—but unfortunately it was out of print.

Chemical Standardization.

Passing on from the work done in the discovery and introduction of new drugs, it may be said that the next contribution to medical and pharmaceutical science had to do with standardization. Thousands of pharmacists still active in practice recall the very serious defects of nearly all medicinal extracts thirty-five years ago—their lack of uniform potency, their great fluctuations in activity between the two extremes of "worthless" and "dangerous"—the entire absence of dependable, unvarying standards of strength, especially for the powerful narcotics and heart-tonics.

The first standardized extract known to pharmacy was introduced by Parke, Davis & Company in September, 1879. In 1883 the number of standardized drug extracts had grown to twenty. The line at first included principally those powerful drugs which are suscepti-

ble of chemical assay by the determination of their alkaloidal content —nux vomica, cinchona, belladonna, gelsemium, henbane, ipecac, mandrake, stramonium, etc.—the final product being adjusted, either by concentration or dilution, to a carefully chosen percentage of active principle. Opposition and ridicule could not long retard the triumph of standardization; to-day every pharmacopœia bears its vindication.

Physiological Assay.

Chemical standardization has its serious limitations, and they were quickly perceived. The principle cannot be applied to a number of powerful agents—ergot, digitalis, convallaria, strophanthus, cannabis indica and all the antitoxic sera—for which no chemical assay of proved worth is as yet available. Here the physiological test on the living animal becomes indispensable.

The first line of physiologically assayed and standardized extracts ever known to pharmacy was marketed by Parke, Davis & Company in the year 1897, and included ergot, Indian cannabis, strophanthus, digitalis and convallaria. To-day not less than 1100 preparations share in the vast improvement which chemical and physiological standardization have alone made possible. Only the physician, who sees every hour that a powerful drug must be tested in the glass tube or on the living animal or on the suffering patient, can appreciate the priceless value of the reform.

Biological Laboratories.

Not a single expectation of profit prompted the first beginning in 1894 of the great laboratories now devoted to the production of antitoxic serums, bacterial vaccines, phylacogens, tuberculins, etc., etc. Mr. Davis, then General Manager, was struck with the wonderful results obtained by Behring and Roux from the serum treatment of diphtheria, and entered the biological field solely in a spirit of scientific enterprise. Credit, reputation, he undoubtedly expected; revenue he had then little reason to look for.

The rapid development of serum-therapy and biological medicine during the past twenty years has transformed and enormously expanded the manufacturer's work. The Biological Department now employs a large staff of men devoted exclusively to biological and biochemical research. Over two hundred people are alone engaged in the routine of producing and testing these agents. The beautiful

farm of Parkedale, near Rochester, Michigan, embraces seven hundred acres, and on it are hundreds of horses for the production of the antitoxic serums, plus thousands of guinea-pigs, rabbits, dogs, roosters and calves.

Animal Gland Therapy.

This is not the place to record the list of biological agents introduced from time to time. It comprises a large number of serums, bacterial vaccines, tuberculins and the like, as well as the group of six phylacogens placed at the disposal of the medical fraternity within the last few years.

The past decade has witnessed a wonderful increase in the medicinal use of ductless glands and a marvelous transformation in the efficacy, the standardized potency and the palatability of the current preparations. A single pound of product offered the physician as it is to-day may be the total yield from two thousand to forty thousand animals. And what notable triumphs in scientific medicine each substance represents! Adrenalin, powerful cardiac and vasomotor stimulant and hemostatic; Pituitrin, priceless oxytocic in uterine inertia; Thyroid Gland for the relief of cretinism and myxedema; Thyreoidectin for the treatment of exophthalmic goitre; Corpora Lutea for mitigating the distress of the natural or artificial menopause—these are only the most notable achievements in a rich and fast-broadening field.

The first animal gland product marketed by Parke, Davis & Company was "Thyroid Desiccated" in 1893. "Suprarenal Glands, Saccharated," in tablets, capsules and powder, was introduced in 1895; "Suprarenal Liquid with Chloretone" in 1900. Both were completely superseded by Takamine's Adrenalin in 1901. Thyreoidectin made its *début* in 1904; Pituitrin in 1908. The latest additions to the remarkable series are the Anterior Lobe of the Pituitary Gland, the Pineal Gland for the treatment of undeveloped or backward children, and the Parathyroid Gland for the treatment of post-operative tetany.

Animal Industry Products.

As far back as 1895 the House began its first studies in the prevention and cure of widespread animal diseases—hog cholera, sheep scab, tuberculosis, blackleg, anthrax, tetanus, glanders, hemoglobinuria (azoturia), contagious abortion, equine influenza, pneumonia

canine distemper, etc., perceiving in this work a rich and vast field for scientific enterprise. The production and standardization of trustworthy disinfectants and sheep dips (Kreso and Kreso Dip) have produced an extensive business in the United States and in foreign countries. The Blacklegoids of the Company enjoy a large sale, despite the free distribution of a similar vaccine by the United States Government.

The Department of Animal Industry is of concern to every veterinary surgeon, every farmer, every ranchman and stock-raiser, every horse-breeder and owner of domestic animals. Its work reposes on a solid foundation of scientific research; its products are subjected to the same rigorous testing and standardization which the "human" medicaments of the House must undergo; and its field of service is illimitable. Already it embraces a considerable variety of antitoxic serums, bacterial vaccines and phylacogens, in addition to the broad materia medica of the veterinary practitioner. To its future growth no bounds can be set.

Research Laboratories.

In the late '70's and early '80's the scientific investigations of the House dealt with the alkaloids and other active principles of vegetable drugs; indeed, they formed the indispensable foundation for chemical standardization. Beginning with 1894 this research work entered on a new phase—the study of immunity in all its bearings, the development of physiological assay processes and methods of standardizing disinfectants, the extraction and perfecting of animal gland products, and a searching investigation of syphilis and cancer.

Much of this work is set forth in the published papers and reports of the Research Staff. The fine structure which is devoted to this department was erected in 1902 at a cost of a quarter million. The maintenance cost is heavy, but is never grudged, for in no other commercial enterprise can be found a deeper conviction that the whole future of the pharmaceutical and biological industry will and must be built on original research.

Experimental Medicine.

Among definite chemical compounds built up or discovered by the House have been substances like Silvol, Formidine, Nargol, Mercurol, Chloretone, Bromalbin, Iodalbin and Brometone. Taka-diastase, too, ought perhaps to be mentioned in this list of discoveries, although

it is not, strictly speaking, a chemical product. So with Pepsin, which has throughout been the subject of constant study, and in the manufacture of which marked improvements have been made from time to time.

In the clinical proving of new medicinal agents at the bedside and in the hospital, we have enjoyed since 1902 the priceless co-operation of thousands of general practitioners and specialists. To them we invariably confide all our laboratory data for corroboration or refutation in a proper series of clinical tests. The reports of these "co-workers" on new agents are treated as strictly confidential and are never published save with the consent of the authors. An adverse report has repeatedly meant the permanent burial of the product. Pending the completion of these clinical studies, whether one year or many years be required, the preparation is never advertised and never sold. The final verdict by the medical jury enables us to base every claim of therapeutic merit not alone on scientific theory or laboratory tests, but also on practical, exhaustive, clinical investigation.

Foreign Markets.

In the foregoing paragraphs there has been sketched, very briefly and imperfectly, the history of scientific activities. A few words may not be amiss regarding the commercial development of the House.

It was in 1887 that Parke, Davis & Company began to reach out for foreign markets, and here ensued a revival of the obstacles and difficulties of the early days. This time the people of foreign lands had to be convinced that real scientific work could be done in a new country like the United States. The task required prophetic vision. It demanded courage. It meant that the House must possess great confidence in its products, and confidence in the vital importance of its scientific message. For many, many years the attempt to gain a foothold in foreign markets resulted only in a succession of costly and bitter defeats, but in time they were followed by a brilliant and lasting success.

The first manufacturing done by Parke, Davis & Company in Canada dates back to August, 1887. The present Canadian plant began its work on a large scale in January, 1891, and has since required three additions. The Eastern Depot for Canada was opened at Montreal in 1898. An office is now maintained also in Toronto and another in Winnipeg.

The advantage of standardized extracts in time proved a convincing argument in the most conservative markets. The first exports were made to Great Britain through London agents. This arrangement lasted until the founding of a British Branch in January, 1891, by the late F. M. Fisk. The establishment of a manufacturing laboratory in Hounslow was made inevitable by the growth of the business and the many disadvantages attending shipments across the ocean.

From time to time the House has succeeded in establishing itself elsewhere throughout the world. A thriving business in Australia rendered necessary the opening of a branch house in Sydney in 1902,

THE CANADIAN LABORATORY IN WALKERVILLE, ONT.

under the management of Cyril C. Murray. The Russian Branch was opened at Petrograd in 1903, and its manager is E. Brier. The Indian Branch, established at Simla, India, in 1899, was removed to Bombay in 1907, and the manager is S. S. Coleman. Two new branches have been opened within the last year—one in Buenos Ayres, Argentine, and the other in Havana, Cuba, and both face a promising outlook.

American Branches.

No ambition to expand, no tempting opportunities to build up an extensive export trade, have ever diverted the energies of the House from its paramount interest—the United States market. Thirteen well-stocked branches and depots have been established at strate-

gic, dominating trade centers throughout the country, to give the drug trade swift and satisfactory service.

The Spanish Americas.

A very important function of the New York Branch is the conduct of a large department devoted to the sale of products in Mexico, Central America, South America, the Philippines and China. For these purposes, price-lists, labels, printed matter and correspondence in many languages are indispensable. For a number of years, too, Parke, Davis & Company carried on in New York a very large department for the sale of imported vegetable drugs to all manufacturing pharmacists. This was discontinued in 1910, the House preferring to devote itself wholly to manufacture. It remains, nevertheless, the largest importer of crude drugs in the United States.

Administrative Changes.

Little has been said in the foregoing regarding the men who have made Parke, Davis & Company what it is today, and, for reasons of modesty, little will be said. It is significant, however, that in fifty years of existence the House has had but three presidents and three general managers. Mr. Parke, the first president, died in 1898, and was succeeded by Theodore D. Buhl. Mr. Buhl died in 1907, and was in turn succeeded by Frank G. Ryan. Mr. Davis, the first general manager, was followed in 1896 by William M. Warren, and at the death of Mr. Warren, in 1903, the post was filled by the election of Ernest G. Swift. Mr. Ryan and Mr. Swift are actively in the harness to-day.

Passing by the living, of whom it would perhaps be indelicate to say anything by way of praise, a word should be said in recognition of services performed by some of the leaders of the past. Mr. Warren, who succeeded Mr. Davis as general manager, lived to complete an administration of only seven years, and yet during that short period the business was trebled. New laboratories, new branches, a large increase in the foreign trade, many valuable products—all bore witness to the remarkable power and popularity of the new chief. His untimely death at the age of thirty-nine cut short a career of rare promise.

Mr. Buhl, who succeeded Mr. Parke as president, gave to the com-

pany the great strength and prestige of a leader in the financial and industrial progress of Detroit. Mr. Wetzel, as secretary and treasurer, was one of the leading figures in the early history of the House, and to him must be given a large measure of credit for the pioneer work done in spreading the name of Parke, Davis & Company in foreign lands. Others there were who made substantial contributions to the cause—who gave lavishly of their ideals, their brains and their ambitions.

Under the present administration the growth of the House in all its departments has continued in accelerating ratio. Branches have been reorganized; many important changes made in the personnel of the staff; hundreds of salesmen added to the small army already "on the road;" the foreign trade increased manyfold; and every activity of the House, whether scientific or commercial, has been aggressively prosecuted. The bane of older houses—"dry rot"—has been avoided by liberal pensions.

In the general treatment of the employees strict discipline is found entirely compatible with a humane, kindly concern for the welfare of the individual. The atmosphere of the House is a happy one; the staff is devoted, loyal, and proudly conscious of the fine traditions which a succession of large-hearted, big-brained men, both living and dead, have developed during fifty years of honest, enlightened and successful toil.

CURRENT LITERATURE.

Saw Palmetto, A Phytochemical Study of the Fruit of Sabal Serrulata.

By Charles August Mann.

After an extensive investigation the author has reached the following conclusions:

1. "The volatile oil so-called, *i.e.*, the mixture of ethyl esters of fatty acids, that is contained in alcoholic galenicals of the drug, is not a volatile oil in the generally accepted sense of the term. Neither is it a so-called ferment oil resulting upon the hydrolysis of a glucoside, such as the oils of wintergreen, sweet birch, mustard, etc. It is formed by condensation of the free fatty acids, which are naturally

contained in the berries, with ethyl alcohol, the preservative. Small amounts of ethyl esters are formed upon fermentation of a sugar, contained in the berries, to ethyl alcohol, if the fresh berries are allowed to stand when they undergo the necessary chemical changes. Considerably larger amounts, however, are formed when, as previously stated, the berries are preserved in alcohol.

2. Mere traces of volatile oil may be obtained from fresh berries, but this does not consist of ethyl esters, at least not to any appreciable extent, but of such of the free fatty acids of the berry as are volatile with water vapor. Owing to the presence of higher fatty acids such an oil is semi-solid. To this extent the true volatile oil of saw palmetto resembles that of the cocoanut, the only other oil of the palm family known at present. Whether a further analogy exists between these two volatile oils cannot be decided until much larger quantities of fresh berries can be distilled, so that sufficient volatile oil for a chemical investigation may be obtained.

3. Although the enzyme lipase has been demonstrated to exist in the berry, its presence is not necessary to explain the condensation of the ethyl alcohol with the free fatty acids to the corresponding ethyl esters. Indeed, the alcohol may even interfere with, if not completely inhibit, the enzyme action if sufficient alcohol could be used. Prolonged contact between the ethyl alcohol and the individual acids has shown that in each case the formation of esters can be accounted for without enzymes or other so-called catalytic agent." (*Bulletin of the University of Wisconsin, No.* 767, 1915.)

C. J. Z.

The Poisonous Principle of Poison Oak.

Poison oak (*Rhus diversiloba,* T. and G.) and poison ivy (*Rhus toxicodendron,* L.) are so much alike from the botanical viewpoint that the slight difference in the shape of the leaflets is the only reason for two species. The conservative botanists Greene and Engler consider *R. diversiloba* to be a "type" or "sub-species" of *R. toxicodendron.*

The fact that the pharmacological action of the two species is identical has given the widespread belief that the *poisons* were identical. W. A. Syme claims to have found upon hydrolysis of the poison of *R. toxicodendron,* rhamnose, gallic acid, and fisetin.

The author was unable to secure these same constituents in *R. diversiloba* and thinks it strange that such closely related plants should have such widely different poisonous principles.

The two species have a slightly different range but " such a difference in the chemical nature of the poisons could hardly be laid to a difference in climate or soil."

" Fisetin, gallic acid, and rhamnose, the constituents of Syme's glucoside, are found in large quantities in *Rhus cotinus*, L., and *Rhus rhodanthema*. It might be supposed from Syme's observations that these species would be poisonous. As a matter of fact, however, neither of these species is poisonous."

The work of Dr. Syme was repeated, gasoline being used as the extractive material in preference to ether, which Syme used. Chips of limbs were used in one experiment while leaves were used in another.

In the summary the author states that " the natural glucoside of fisetin, rhamnose and gallic acid is non-toxic," and " there is not sufficient evidence that a poisonous substance which Syme attempted to decompose was not a complex containing a poisonous body and one or more non-toxic glucosides in addition." (J. B. McNair in *Jour. Am. Chem. Soc.*, xxxviii, No. 7, p. 1417, 1916.)

On the Constituents of Poison Ivy.

Under this title S. F. Acree criticizes the foregoing article of McNair. Dr. Syme worked on the *ether* extract of the *leaves* and *flowers* of one species while McNair worked on the *gasoline* extract of the limbs of the other species under discussion, and secured different results. " He therefore concludes that Syme's work is wrong. The only other comment to be added is that McNair may not have given sufficient weight to the well-known fact that the botanical differences may often be detected only with difficulty whereas the chemical difference may differ widely. This phase of the work has been discussed a number of times, especially by Schorger." Then it was shown that lavender, fennel, etc., produce different oils when grown under different climatic and soil conditions. Also that the distillate of the *wood* of certain pine trees differs decidedly from that of the *leaves* and *twigs* so that " it would be dangerous to assume that the poison occurring in the *leaves and flowers* of Rhus toxicodendron should be found in the *bodywood* of this plant and certainly it would be inadmissable to assume that this same poison, or the same non-toxic constituents should be found in the *limbs* of an entirely different species, *R. diversiloba*." (S. F. Acree, Jr., in *Jour. Am. Chem. Soc.*, xxxviii, No. 7, p. 1421, 1916.) C. J. Z.

The Castor-Oil Plant of India.

The castor-oil plant is cultivated throughout India. There are said to be 16 varieties grouped into two types. One is a tall bush or small tree of *perennial* growth, usually planted as a hedge or in lines through the fields where it affords desirable shade to other and more valuable crops. The seed of this type is *large* and contains an abundance of *inferior* oil. The other type is an *annual* plant producing *small* seeds from which the better grades of oil are expressed.

Bengal is the chief exporting province for *oil,* while *seeds* are mostly shipped from Bombay.

Previous to the war the exports of castor-oil from India showed a tendency to diminish, while the traffic in castor seed very materially increased. This is due to three causes; first, most foreign countries have an import tax on the oil and oil cake while the seeds are entered free; second, the transportation of seeds by sea is easier and less expensive than the carriage of the oil; third, improved and expensive machinery in Europe and America has raised the standard of the oil as well as lowered the cost of production. Some European machinery for expressing the oil is used in India. (*Commerce Reports,* No. 228, 1916.)

THIRTEENTH ANNUAL CONVENTION OF THE NATIONAL ASSOCIATION BOARDS OF PHARMACY.

By Prof. E. L. Newcomb.

(*Continued from page 480*)

Recommended that since the Supreme Court of the United States has handed down a decision that the possession of narcotics does not constitute a violation of the "Harrison Act," and since we believe this decision has largely nullified the intentions of the law, we recommend and urge that Congress enact an amendment to the Harrison Law whereby the main objects of this law be not impaired or defeated.

Mr. H. L. Meredith, chairman of the Legislative Committee, was called on for the report of that committee. Recommendations of the committee that were adopted are as follows:

No. 1: Providing that it shall be unlawful for any person, unless

he is registered with the United States Collector of Internal Revenue in the district in which he resides, to sell, dispense or give away any preparation or remedy containing any opium or coca leaves, their salts, alkaloids or derivatives or other potent drugs or chemicals which may be enumerated in the so-called Poison or Anti-narcotic laws of the State or District in which he may reside. A detention as well as monetary penalty to be attached. Enforcement to be placed in the care of the state's Pharmacy Board.

No. 2: Providing a heavy penalty for false representation as a registered pharmacist, licentiate in pharmacy, assistant pharmacist, etc.

No. 3: Requiring that every drug store be supplied with a copy of the latest edition of the United States Pharmacopœia and National Formulary. Penalty suggested to be double the cost of the edition mentioned plus cost of prosecution. Enforcement with the Board of Pharmacy.

No. 4: Requiring that the Registered Pharmacist who is in charge of a pharmacy or "department of pharmacy," whether proprietor or manager, shall in addition to displaying his certificate, have his name affixed either upon separate or composite labels placed on medicinal agents, while in charge as Registered Pharmacist. Also, there shall be caused to be conspicuously displayed over the entrance to the drug store or department of pharmacy the name of the Registered Pharmacist in charge. Fine for violation to be paid by the owner or employer. Enforcement in charge of Board of Pharmacy.

No. 5: Requiring the holder of every certificate, when he renews same, in states where renewals are required, to state whether he is a proprietor or an employer. Certificate not to be granted until such information is given.

No. 6: Providing for the appointment by the N.A.B.P. of a committee of five members from this body whose duty it shall be to enter into conference with the proper officials of the Internal Revenue Department, with the end in view that of eliminating from the processes of the Harrison Law such drugs and chemicals which, from their very nature, automatically are eliminated from the class of habit-forming drugs.

Nos. 7 and 8 were rejected.

No. 9: Your Committee recommends that the President, Secretary and Chairman of the Executive Committee constitute a committee whose duty it shall be to confer with the Program Committee of the

A.Ph.A. to the end that the more important sessions of the two bodies be so arranged as to entail the least possible conflict.

President Burton next called for the report of the Advisory Examination Committee, and Secretary Christensen read that report. The main thoughts centred on greater efficiency, and it was pointed out that the time would come when the examiners would be required to submit to an examination relative to their qualifications for these important positions. This promotion should be encouraged by the boards of pharmacy.

The report of the Advisory Committee was adopted.

The President appointed a committee composed of Jno. A. Weeks, Texas, Edward Bloomfield, Kentucky, and Edward Walsdorf, Louisiana, to draft a resolution with regard to time of filing applications for Reciprocal Registration. Mr. Bloomfield made the following report:

All applicants for Reciprocal Registration must file their applications with the Secretary of the Board in which he desires to reciprocate within ninety days after receiving the official application blank from the National Secretary. If said applicant for Reciprocal Registration is rejected by the Board of Pharmacy then all fees shall be returned to him (except the $1.00 fee to the Secretary of the Board of Pharmacy from which he applies, for certifying to registration and grades). If said applicant fails to file his application with the Secretary of the Board within ninety days after receiving the same, then said application blank shall be void and said applicant shall forfeit the entire fee. The Secretary of the National Association Boards of Pharmacy shall date said application blank as of the day issued and the Secretary of the State Board shall date said application blank as of the day received.

The report of the committee was adopted, to go into effect the first of October, 1916.

After discussion regarding ways and means of increasing revenue to the Association, a recommendation to increase the annual dues of "Active" member states of the N.A.B.P. from $15.00 to $35.00 was adopted. The fee for application blank for "reciprocal registration" was increased from $5.00 to $15.00, to take effect October 1, 1916.

President Burton called for the report of the Nominating Committee, which was read by H. L. Haussaman, recommending the following officers for next year: President, Lawrence C. Lewis, of

Alabama; first vice-president, John A. Weeks, of Texas; second vice-president, D. W. Ramsaur, of Florida; third vice-president, John A. Leverty, of Connecticut; secretary, H. C. Christensen, of Chicago; treasurer, F. W. Ward, of Memphis. The following were elected to serve on the various committees. Executive committee, E. G. Cox, of Missouri; chairman of the advisory examination committee, H. C. Christensen, of Chicago; Syllabus Committee, Charles H. Skinner, of Vermont.

The report of the committee was adopted and the gentlemen named were elected as officers of the Association for the ensuing year.

The session was adjourned to meet Saturday evening at half-past eight.

Adjourned Fourth Session—Saturday evening.

President Burton called the Association to order in the Assembly Room of the Rittenhouse Hotel, at 8 45 o'clock, and called for the report of the Auditing Committee, which report was presented by E. C. Cox, Missouri, and adopted.

The installation of officers then took place and the convention adjourned.

PHILADELPHIA COLLEGE OF PHARMACY.

Minutes of the Semi-annual Meeting.

The semi-annual meeting of the Philadelphia College of Pharmacy was held September 25, 1916, at 4 P.M. in the Library, the President, Howard B. French, presiding. Fourteen members were present. The minutes of the quarterly meeting, held June 26, were read and approved. The minutes of the Board of Trustees for June and August were read by Mr. Joseph W. England and approved.

The report of the Committee on Nominations was read and ordered entered and filed.

The delegates to the meeting of the American Pharmaceutical Association held at Atlantic City, N. J., September 5–8, reported verbally through Professors Kraemer and Remington. An extended report is published in the American Journal of Pharmacy for October, 1916, p. 463.

In connection with the report of the delegates to the American Pharmaceutical Association a report was made of the work of the

committee of the college appointed to co-operate with similar committees appointed by the New York and New Jersey branches of the American Pharmaceutical Association and the parent Association to provide entertainment for the visitors and members of the Association. It was stated that everything passed off very pleasantly and successfully. The committees did well with the funds at their disposal.

Report was made of the exhibition in the museum of the college to celebrate the semi-centennial of the Alumni Association and also made in honor of the meeting of the American Pharmaceutical Association. The exhibit was visited by many pharmacists and the general public. (See p. 448 AMERICAN JOURNAL OF PHARMACY.) There was much detail work necessary in getting the exhibits together and the thanks of the college were voted to the committee for their untiring efforts in making the convention a success.

The secretary reported the names of five members who were delinquent in payment of dues—thereby forfeiting their membership—whereupon they were declared as having forfeited membership.

Election for Trustees.—Before the balloting began Mr. Edwin M. Boring stated he had been a member of the Board of Trustees for 30 years and now desired to withdraw his name as a candidate. His declination was not received. The tellers reported that Messrs. Edwin M. Boring, Theodore Campbell and Charles Leedom had been re-elected to membership in the Board of Trustees for the ensuing three years.

The President stated that this day was the 85th anniversary of the birth of the oldest living graduate of the College, viz., Mr. Frederick Gutekunst, the eminent photographer. The College was indebted to him for many acts of generosity on his part. Other members spoke in a similar vein, when on motion of Professor Remington the Secretary of the College was directed to convey to Mr. Gutekunst its appreciation of his services and express the hope of continued usefulness for the future.

A member alluded to an editorial in one of the Philadelphia daily papers which condemned the advertising of quack medicines—an interesting discussion followed, some of the members favoring thanking the paper quoted, others opposing it. Several questions were brought up, viz., the question of publishing formulas on labels, the use of so-called household remedies; the attitude of the American Medical Association, but no action was taken.

Professor Remington notified the members of the coming awards of scholarships to students and requested information about prospective candidates. The question was asked as to the status of students receiving scholarships who failed to make good, when it was learned that scholarship privileges are withdrawn from such as fail to pass their examinations.

Mr. Beringer stated that there had been no revision of the by-laws for some years. The amendments to the by-laws which have been adopted since the last revision should be included as also the condensed history of the College should be brought up to date. On motion, it was ordered that the Committee on By-laws prepare such revision for publication later.

C. A. WEIDEMANN, M.D.,
Recording Secretary.

ABSTRACTS FROM THE MINUTES OF THE BOARD OF TRUSTEES.

June 6, 1916.—Fourteen members were present. The Committee on Instruction reported having given consideration to the Annual Reports of the Faculty. Professor Kraemer reports having sold 36 of the old microscopes in his laboratory, which have been replaced by new ones. He expects to dispose of the remaining 14 microscopes during this year and requests the purchase of 50 additional microscopes. The committee recommends that there be an address by the President, the Dean and some prominent speaker, at the opening exercises of the College. The Sub-Committee on Special Lecturers, as an adjunct to our curriculum, arranged for a course of very interesting lectures, and the committee has also arranged for a course of special lectures—12 in number—to be given during the next season, providing it meets with the approval of the board. The instruction in the Department of Bacteriology and Hygiene will be very materially increased with the establishment of the post-graduate and advanced courses, and the tuition fee will be $50. Upon the successful completion of this course, a certificate will be awarded.

The Committee on Examinations stated that the Wellcome Cup would not be awarded to the second-year class this year. Mr. French read a draft of a letter to be sent to the Board of Education and the principals of ten high schools in the city, regarding scholarships in the

College. On motion, it was approved. Communications from Prof. Stroup, Dr. Paul S. Pittenger and Mr. Ivor Griffith were read, expressing their appreciation of their appointments.

August 16, 1916.—Special meeting. Twelve members were present. After the call of the special meeting had been read, Mr. French read the following communication from Dr. Edgar F. Smith, Provost of the University of Pennsylvania:

"AUGUST, 15, 1916.

DEAR PRESIDENT FRENCH:

Referring to the correspondence and conversation had with Mr. Bell and myself relative to the taking over by the Philadelphia College of Pharmacy of the Department of Pharmacy of the Medico-Chi agreed to be merged and consolidated into the University, I beg to say that after communication with the members of the Committee in charge, we have agreed to accede to your desire and request that this Department of Pharmacy be transferred and merged into the Philadelphia College of Pharmacy. We do this in the interest of and for promoting higher pharmaceutical education in the City of Philadelphia, and with the understanding that you will add Dr. Sturmer to your professorial staff at the salary he has heretofore been receiving at the Medico-Chi. We are not under any obligations, as I understand it, to engage any of the assistant professors or instructors, but I feel confident that you will recognize any moral claims that may be pressed upon you by any of those who otherwise will be without employment.

I am very much gratified by this arrangement. With best wishes for the success of the Philadelphia College of Pharmacy, I am very sincerely,

[SIGNED.] EDGAR F. SMITH.

To HOWARD B. FRENCH,

" President, Philadelphia College of Pharmacy."

The Dean moved that the proposition of the University of Pennsylvania be accepted, which was seconded by Mr. England and unanimously adopted. A preamble and resolution was submitted and forwarded to Provost Smith by Mr. Beringer, who signed the same as Chairman of the Board of Trustees and same was attested to by the secretary. Prof. J. W. Sturmer was elected as a member of the Faculty and Associate Dean, his services dating from September

1st, 1916. The Dean moved that matters of detail relating to instructions, as made by the merger, be referred to the Committee on Instruction. It was so ordered. It was ordered that proper publicity be given to the merger by the Publicity Committee.

September 1, 1916.—Special meeting. Twelve members were present. Mr. Beringer, on behalf of the Committee on Instruction read a special report pertaining to the merger of the Department of Pharmacy of the Medico-Chirurgical College with the Philadelphia College of Pharmacy and other problems. The report was a lengthy one and gave full detailed information on the various subjects considered. The committee made a number of recommendations and on motion, it was voted to consider them seriatim.

First. Increase of entrance requirements from 15 academic counts—the equivalent of one year's high school work—to 30 academic counts—the equivalent of two years' high school work. This recommendation to become effective with the sessions beginning 1917–1918, and that prompt announcement be made of same. Adopted.

Second. Relating to rules, order and conduct as proposed, and that all rules and regulations in conflict be rescinded. Adopted.

Third. Opening day exercises. The committee referred this matter to the President and Dean. A communication was received from Hon. Edwin S. Stuart, accepting the invitation to address the classes.

Recommendations following the merger of the Medico-Chi Department of Pharmacy with the Philadelphia College of Pharmacy:

Fourth. That Prof. J. W. Sturmer, formerly associated with the Medico-Chirurgical College, in addition to being made Associate Dean of the Philadelphia College of Pharmacy, be elected Professor of Pharmaceutical Chemistry, and that a course in Pharmaceutical Assaying and Testing of Organic Compounds more especially relating to manufacturing pharmacy, be prepared, for the post-graduate course. Adopted.

Fifth. That Prof. F. E. Stewart, formerly associated with the Medico-Chirurgical College, be elected to give a course of lectures on laws relating to pharmacy and pharmaceutical jurisprudence. Adopted.

Sixth. That Prof. C. E. Vanderkleed, formerly associated with the Medico-Chirurgical College, be elected to deliver a course of lectures in Industrial Pharmacy, to students of the higher classes, with mid-year and final examinations. Adopted.

Seventh. That Mr. J. Edward Brewer, formerly associated with the Medico-Chirurgical College, be elected as assistant in the didactic instruction in chemistry, and instructor and full time assistant in the Chemical Laboratory. Adopted.

Eighth. That Dr. Heber W. Youngken, formerly associated with the Medico-Chirurgical College, be made an assistant professor in the Department of Botany and Pharmacognosy, and assistant curator of the museum. Adopted.

Ninth. That Dr. R. P. Fischelis, formerly associated with the Medico-Chirurgical College, be elected to deliver a course of lectures in connection with commercial pharmacy instruction and on allied subjects, such as pharmaceutical journalism and advertising. Adopted.

Tenth. To establish a three years' course, the last year of which shall be a complete daily course of not less than five days per week, for at least thirty weeks, in resident laboratory and didactic instruction of the College and based upon the completion of our two-year course in pharmacy or its equivalent. That the entrance requirements be the completion of a four years' high school course or its equivalent (60 academic counts). That store experience be not required as a pre-requisite for graduation, and that the degree of Pharmaceutical Chemist (Ph. C.) be awarded upon the successful completion of the course. Adopted.

Mr. Beringer stated that proposed changes in the By-laws made necessary by the merger would be presented to the Board of Trustees.

News Item.

Prof. John Uri Lloyd was given a Testimonial Dinner at the Hotel Gibson, Cincinnati, Ohio, Tuesday evening, October 17th, by the Cincinnati branch of the American Pharmaceutical Association, in honor of his receiving the degree of Doctor of Science which was conferred on him by the University of Cincinnati. The banquet was attended by a large number of druggists and many prominent men in other walks of life. Among the speakers were Frank H. Freericks; Charles W. Dabney, President of the University of Cincinnati; Judge R. B. Smith; Dr. Martin Fischer; and Prof. C. T. P. Fennel, Dean of the Cincinnati College of Pharmacy. Fred. S. Kottem, Secretary of the Ohio Valley Druggists' Association, was the Chairman of the Committee on Arrangements.